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Potential impact of minimum unit pricing for alcohol in Ireland: evidence from the National Alcohol Diary Survey

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8 **National Alcohol Diary Survey**
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Abstract

Aim: One of the main provisions of the Irish Public Health (Alcohol) Bill is the introduction of a minimum unit price (MUP) for alcohol in Ireland, set at €1.00/standard drink. We sought to identify who will be most affected by the introduction of a MUP, examining the relationship between harmful alcohol consumption, personal income, place of purchase and price paid for alcohol.

Method: A nationally representative survey of 3,187 respondents aged 18-75 years, completing a diary of their previous week's alcohol consumption. The primary outcome was purchasing alcohol at < €1.00/standard drink; secondary outcome was purchasing alcohol at < €1.00/standard drink off-sales. Primary exposures were harmful alcohol consumption (AUDIT-C >5), low personal annual income (< €20,000) and place of purchase (off- or- on-sales).

Results: One in seven respondents (14%) spent <€1.00/standard drink, with a median spend of 0.78/standard drink. High risk drinkers (OR 1.56, 95% CI 1.09-2.23), men (OR 1.95, 95% CI 1.43-2.66), people on low income (OR 1.64, 95% CI 1.20-2.23) and those purchasing alcohol off-sales (OR 21.9, 95% CI 12.5-38.1) were most likely to report purchasing alcohol at <€1.00/standard drink. Forty-four per cent of alcohol consumed was purchased off-sales. Of those purchasing off-sales, 30% bought cheap alcohol. High risk drinkers, men and those on low income were most likely to report paying <€1.00/standard drink off-sales.

Conclusion: Heavy drinkers, men and those on low income seek out the cheapest alcohol. The introduction of a MUP in Ireland is likely to target those suffering the greatest harm, and reduce alcohol-attributable mortality in Ireland. Further prospective studies are needed to monitor consumption trends and associated harms following the introduction of minimum unit pricing of alcohol.

Introduction

Excessive alcohol consumption is one of the greatest public health challenges, both in terms of morbidity and mortality. Alcohol was recently identified as the fifth largest risk factor for the global burden of disease, accounting for an estimated 2.7 million deaths globally (Lim et al., 2012). The EU region has the highest level of alcohol consumption in the world, with an average of 10.1 litres of pure alcohol per capita (OECD, 2014), and the highest alcohol-attributable burden of disease (Rehm et al., 2009). Ireland reported the fifth highest level of alcohol consumption in Europe, with 11.6 litres per capita. This is substantially higher than the European average, and is 15% higher than the UK average (OECD, 2014). Given the relatively high rate of abstinence in Ireland, estimated at approximately 19% (World Health Organisation, 2014), actual alcohol consumption among drinkers is likely to be close to 14 litres. Furthermore, the prevalence of heavy episodic drinking in Ireland, defined as 60 or more grammes of pure alcohol on at least one single occasion at least monthly, remains high (39%) relative to the European average of 16.5% (World Health Organisation, 2014).

Alcohol-related harm costs the Irish State an estimated €3.7 billion annually or 1.9 per cent of total GNP, with €2.4 billion of that accounted for by health and crime-related costs alone (Byrne, 2010). Between 2000 and 2004, alcohol was estimated to have caused 4.4% of deaths in Ireland, including deaths from chronic-alcohol related conditions such as alcoholic liver disease and liver cancer, and accidental and non-accidental deaths while under the influence of alcohol. Furthermore, for all conditions, the proportion of deaths attributable to alcohol was greater in men than in women (Martin et al., 2010). In 2008 an average of 88 alcohol-related deaths were recorded every month in Ireland (Lyons et al., 2011). Recent international studies have repeatedly shown that alcohol-attributable mortality is higher in lower socioeconomic groups (Harrison and Gardiner, 1999; Metcalfe et al., 2005; Probst et al., 2014; Mackenbach et al., 2015). For example, a recent meta-analysis of data from 14 countries showed, depending on the measure of socioeconomic status, a

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2
3 three to ten-fold increase in alcohol-attributable deaths in men with a lower socioeconomic status
4
5 (Probst et al., 2015). For women with a lower socioeconomic status the increased risk of alcohol-
6
7 attributable deaths was between approximately two to six-fold. These effects may reflect a higher
8
9 prevalence of harmful consumption among lower socioeconomic groups or a higher vulnerability to
10
11 the effects of alcohol (Makela and Paljarvi, 2008; Mackenbach et al., 2015), due in part to the fact
12
13 that heavy drinkers from lower socioeconomic groups are more likely than their affluent
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15 counterparts to consume alcohol as part of a suite of unhealthy behaviours such as smoking, excess
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17 weight and poor diet (Bellis et al., 2016).
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21 In an attempt to address these public health concerns the Irish government introduced the Public
22
23 Health (Alcohol) Bill in 2015. One of the main provisions of the Bill is the introduction of a minimum
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25 unit price (MUP) for all alcohol sold in Ireland, set at 10 cent per gramme of alcohol or €1.00 per
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27 standard drink (1 standard drink=10g of pure ethanol). A minimum unit pricing policy targets drinks
28
29 that are high in alcohol content and sold relatively cheaply, as the minimum selling price increases in
30
31 proportion to the alcohol content in the drink (Brennan et al., 2014). The appeal of minimum unit
32
33 pricing from a public health perspective is that it increases the price of cheap alcohol, the drink of
34
35 choice for heavy drinkers, subsequently reducing rates of alcohol-related harms (Kerr and
36
37 Greenfield, 2007; Black et al., 2011; Crawford et al., 2012; Sheron et al., 2014). The Scottish
38
39 Government also passed the Alcohol (Minimum Pricing) (Scotland) Act in 2012, legislating to
40
41 implement a MUP at 50p per unit across Scotland. However, the Scottish legislation is subject to
42
43 ongoing legal challenges and the implementation date remains uncertain. The UK government
44
45 indicated that the introduction of MUP in the UK remains under review pending the outcome of this
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47 legal case brought by the Scottish Whisky Association against the Scottish Parliament's legislation
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49 (HM Government., 2015).
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3 Given the ferocity of the debate surrounding the introduction of a minimum unit price, an empirical
4 evidence base is critical to inform policy decision-making (Sharma et al., 2014). Those opposed to
5 the introduction of a minimum unit price have argued that it is regressive and poorly targeted,
6 disproportionately affecting moderate drinkers on low incomes (Gornall, 2014). Evidence emerging
7 from the Sheffield Alcohol Policy Model refutes this assertion, suggesting that a minimum unit price
8 would have greater effects on heavy drinkers than on moderate drinkers (Purshouse et al., 2010;
9 Holmes et al., 2014; Meier et al., 2016). While these mathematical modelling studies are
10 informative, we also need to consider individual level data from people in relation to their income,
11 amount of alcohol they consume and the price they pay for alcohol to identify who will be most
12 affected by the introduction of a MUP (Crawford et al., 2012). Therefore the aim of this study was to
13 examine the relationship between harmful alcohol consumption, income, place of purchase and
14 price paid for alcohol in a national Irish sample of adults.
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32 **Methods**

33 *Sampling and study population*

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36 We analysed data from Ireland's 2013 National Alcohol Diary Survey (Long and Mongan, 2014). This
37 national cross-sectional survey recruited a stratified clustered sample of 5,991 individuals aged 18-
38 75 years living in private households in Ireland. The sampling frame used was the GeoDirectory, a list
39 of all addresses in the Republic of Ireland, distinguishing between residential and commercial
40 establishments. It was a multistage probability sample; the first stage involved the selection of
41 geographical areas and the second stage involved stratifying the sampling frame by the degree of
42 urbanicity and social class, to ensure selected points were representative of the target population.
43 All selected addresses using this sampling process were visited during the fieldwork period, and
44 interviewers attempted to interview all adults aged 18-75 years living at each address. The surveys
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3 involved a face-to-face interview in the participants' home and a self-completion questionnaire. The
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5 home interviews were conducted by trained professional social interviewers using Computer
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7 Assisted Personal Interviewing (CAPI). Interviews were completed between July and October 2013,
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9 and achieved a 67.2% household response rate and a 77.1% within-household response rate.
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11 12 13 14 15 *Data collection*

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17
18 Respondents, who reported drinking in the past 12 months, were asked to recall their drinking in the
19
20 last 7 days, recording each drinking occasion by day of the week, the types and amount of each
21
22 alcohol beverage consumed on each occasion, as well as where they drank on each occasion.
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25 Quantity was measured by asking how many standard drinks were consumed on each drinking

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27 occasion. In Ireland a standard drink contains 10g of pure alcohol and is equivalent to half a pint of
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29 beer or cider, a single pub measure of spirits, a small (100ml) glass of wine or bottle of alcopops.

30
31 Respondents were provided with beverage-specific flash cards so they could accurately report how
32
33 many standard drinks they consumed for each drink type on each drinking occasion. In addition,
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35 respondents reported how much they spent on each drink and where each drink was purchased.
36

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38 Place of purchase was then categorised as on- or off-sales, where on-sales refer to purchases in bars,
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40 restaurants, clubs, pubs or hotels; with purchases from convenience stores, specialist off-licenses
41
42 and supermarkets classified as off-sales.
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44
45 We assessed harmful drinking using the three item AUDIT-C (Alcohol Use Disorders Identification

46
47 Test-Consumption). AUDIT-C scores range from 1 to 12, with a score of five or more indicating

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49 excessive or harmful alcohol consumption and a score of 10 or more suggesting probable alcohol

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51 dependence (Bush et al. 1998; Dawson et al. 2005). We also recorded respondents' age, gender,

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53 relationship status and personal net income (by income-band). We used flash cards to assess income

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55 to facilitate accurate recordings given the sensitive nature of the question (Jordan et al., 1980).
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3 Respondents were reminded that their personal net income refers to all types of income including
4 employment, social welfare payments, child benefit, rents, interest and pensions, and that it refers
5 to income after tax, pay related social insurance (PRSI) and other levies have been removed. We
6 used a cut-off point of €20,000 per annum to indicate those on low incomes, a threshold similar to
7 previous UK studies (Chouhan et al., 2011; Crawford et al., 2012). The study was granted ethical
8 approved by the Royal College of Physicians in Ireland and all participants gave written informed
9 consent.
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18 *Statistical analysis*

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21 The primary outcome of interest was purchasing alcohol below the proposed minimum unit price of
22 €1.00/standard drink or 10 cent per gramme of alcohol. Price paid per standard drink was calculated
23 as total weekly expenditure divided by total weekly standard drinks consumed. Price paid per
24 standard drink off-sales was the secondary outcome, calculated as total weekly expenditure off-sales
25 divided by total standard drinks consumed excluding drinks consumed but not purchased off-sales.
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33 Statistical analyses were performed using Stata version 13. All analyses were weighted with respect
34 to age, gender and regional distribution to ensure that data were nationally representative.
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37 Descriptive statistics were reported as number (percentages) for categorical variables, and median
38 and interquartile range (IQR) for weekly alcohol consumption, and weekly spend on alcohol. Logistic
39 regression was used to assess the relationship between purchasing alcohol below the proposed
40 minimum unit price of €1.00 per standard drink, and the following covariates: age, gender, high risk
41 drinking (AUDIT-C), income, and place of purchase. Our secondary outcome was paying less than
42 €1.00 per standard drink off-sales. We used the same methods as those described for our primary
43 outcome. We also tested for an interaction between high-risk drinking and income in relation to
44 purchasing cheap alcohol off-sales.
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Results

A total of 5,991 respondents were interviewed. The total rate of abstinence, defined as consuming no alcohol in the previous 12 months, was 20.6% (95% Confidence Interval, 19.2% -22.1%). Those reporting lower incomes were significantly more likely to report abstinence (OR 1.5, 95% CI 1.29-1.75). Sixty nine per cent (n=3,187) of those who consumed alcohol in the last year, drank in the week prior to this survey, and completed a diary of their previous week's alcohol consumption. The study sample (n= 3,187) for this paper included 1,650 (54%) men and 1,537 (46%), who completed the alcohol consumption diary, with a mean age of 42 years (SD 14.8) (Table 1). The majority of participants reported cohabiting with a partner or married (65%). Three hundred and fifty three participants (11%) declined to provide information on their annual personal income. Of those who gave income information (n=2,834, 89%), 52.3% reported an annual personal net income less than €20,000. Women were significantly more likely to report falling into the low income bracket (61%, $X^2(1) = 75.7, p < 0.001$). Of the participants reporting complete AUDIT-C data (n=3,147, 98.7%), total scores ranged from 1 to 12, with a mean score of 5.8 (SD 2.6). Thirty-seven per cent of participants were identified as low-risk drinkers (AUDIT-C score 0-4), compared to 63% with AUDIT-C scores of ≥ 5 . Higher risk drinkers (AUDIT-C score of ≥ 5) were more likely to be men than women (76% vs. 48%, $X^2(1) = 261.4, p < 0.001$). Almost one in ten respondents reported an AUDIT-C score > 10 (9.5%). The median number of standard drinks consumed, where one standard drink is equivalent to 10 grams alcohol, was eight, and the median total weekly spend on alcohol was €18.00. Men and high risk drinkers reported significantly greater quantities of alcohol and spending ($p < 0.001$).

INSERT TABLE 1

The three most popular drinks were beer (45% of all standard drinks purchased), wine (31.9%) and spirits (15.1%). Gender differences in drink preferences are displayed in table 2. Beer accounted for the greatest proportion of standard drinks consumed by men, whereas wine was the drink of

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3 preference for women, followed by spirits. Almost half of all alcohol (47%) was purchased in pubs
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5 and bars, with 38% purchased in supermarkets and 6.5% in off-licence stores. The remaining alcohol
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7 purchases were in convenience stores, garages and duty-free. The majority of low-cost alcohol,
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9 alcohol purchased below €1.00/ standard drink, was purchased in supermarkets (69%).
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16 INSERT TABLE 2
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18 *Price paid per standard drink*
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21 The median price paid per standard drink was €2.05, ranging from €0.096 to €40.59. One in seven
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23 participants (14%) reported paying below €1.00/standard drink for the alcohol they bought. The
24
25 median price paid per standard drink among those purchasing alcohol below €1.00/ standard drink
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27 was 0.78 cent, this is compared to a median price per standard drink of €2.16 for those purchasing
28
29 alcohol at \geq €1.00/standard drink. The characteristics of those paying below, or at/above €1.00/
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31 standard drink are presented in Table 3. The multivariate logistic regression analysis demonstrates
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33 that high risk drinkers, men and those on low income were significantly more likely to report
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35 spending below €1.00/standard drink. Furthermore, those who reported purchasing alcohol as off-
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37 sales only, relative to those reporting on-sales only, were over twenty times more likely to report
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39 spending below €1.00/standard drink (Table 3).
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45 INSERT TABLE 3
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47 *Price paid per standard drink off-sales*
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49
50 Purchasing alcohol as off-sales was found to be the strongest predictor of purchasing below the
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52 minimum unit price (Table 3). Forty-four per cent of all alcohol consumed was purchased as off-
53
54 sales, with almost all being purchased from supermarkets (79%), followed by specialist off-licenses
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56 (15%), and convenience shops (6%). The median price paid per standard drink off-sale was €1.27. Of
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3 those who purchased alcohol off-sales, approximately one in three (30%) reported purchasing low
4
5 cost alcohol off-sales compared to only 1% for on-sales purchases. The median price paid per
6
7 standard drink off-sales for those purchasing alcohol at less than €1.00/standard drink was €0.83.
8

9 **Over three-quarters (78%) of low cost off-sales alcohol was purchased in supermarkets.** The most
10
11 common low priced drink purchased off-sales was beer, with 47% of all off-sales beer purchased
12
13 below €1.00 per standard drink, followed by cider (40%) and spirits (30%). Thirteen per cent of off-
14
15 sales wine was purchased below €1.00 per standard drink. Those purchasing alcohol at <€1.00/
16
17 standard drink off-sales had a median AUDIT-C score of 7 (IQR 4) compared to a median score of 5
18
19 (IQR 4) among those buying alcohol above this price. As displayed in table 4, high risk drinkers, men
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21 and those on low income were significantly more likely to report purchasing alcohol below €1.00/
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23 standard drink off-sales.
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28 INSERT TABLE 4
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Discussion

In this nationally representative study of Irish adults we found that high risk drinkers, men, and those with a personal income of less than €20,000 per annum are most likely to purchase cheap alcohol. Those who purchase alcohol off-sales are also significantly more likely to report purchasing low cost alcohol. When we focussed on off-sales purchases alone, these effects remained such that high risk drinkers, men and those on low income are most likely to report purchasing alcohol at less than €1.00 per standard drink off-sales, the proposed MUP in Ireland. It is important to note that the effects of low-income need to be balanced against the finding that those on low-income are also significantly more likely to report abstaining from alcohol consumption. The majority of low cost alcohol was purchased in supermarkets.

While a number of studies have examined individual level data regarding minimum unit pricing and the price people pay for alcohol for their own consumption, previous studies have focussed on people with serious alcohol-related problems in a hospital setting (Black et al., 2011; Sheron et al., 2014; Black et al., 2014; Gill et al., 2015) or a convenience sample of members of the public (Crawford et al., 2012). This is the first study to investigate the potential impact of minimum unit pricing by examining the relationship between harmful alcohol consumption, personal income, place of purchase and price paid for alcohol at a population level. Similar to our findings, the cross-sectional study of 515 members of the public across a number of cities and towns in South England found that 65.7% of respondents had an AUDIT-C score of ≥ 5 , with 9.6% reporting an AUDIT-C of 10 or more. Consistent with our findings, they also found high risk drinking to be greatest among men (Crawford et al., 2012). While the results from the UK studies are not directly comparable, as they tested the effects of a MUP of <50p/unit which is approximately €0.70 per 8 grammes of alcohol, similar to our findings all studies revealed that high risk drinkers are most likely to purchase off-sales alcohol at less than the MUP (Crawford et al., 2012; Sheron et al., 2014; Gill et al., 2015).

Unsurprisingly, the proportion of respondents purchasing cheap alcohol was higher in studies of

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2
3 people with serious alcohol-related problems in a hospital setting, compared to our study (Black et
4 al., 2011; Sheron et al., 2014; Gill et al., 2015). For example, Black et al found that 83% of units were
5 purchased below the MUP of 50p/unit (Black et al., 2011). This is compared to 30% in our study and
6
7 41.7% in the study by Crawford and colleagues (Crawford et al., 2012). Unlike Crawford et al. we did
8
9 not, however, find evidence of an interaction effect between income and harmful alcohol
10
11 consumption in our multivariate analysis. These differences may be due to a number of factors.
12
13 Firstly, we reported on personal annual income of above or below €20,000 rather than household
14
15 income of above or below £15,000. In addition, 11% of respondents in our study refused to report
16
17 their personal income, compared to 4.1% in the UK study.
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23 *Strengths and limitations of the study*

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26 This is the first nationally representative study to consider the impact of introducing minimum unit
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28 pricing, by examining the relationship between alcohol consumption, income, place of purchase and
29
30 price paid for alcohol. We used a valid and reliable measure of harmful alcohol consumption,
31
32 namely the AUDIT-C, which will allow for future comparisons with other studies. However, the study
33
34 has a number of limitations which need to be considered when interpreting the findings. While our
35
36 findings are nationally representative, general population surveys such as this often fail to recruit the
37
38 most extreme drinkers, as they may be difficult to contact and if contacted may be less likely to
39
40 agree to participate (Leifman, 2000). In addition, all data were self-report, thus introducing potential
41
42 biases in recall and reporting. However, as participants were reporting on their last week's drinking
43
44 recall bias is less likely to be a concern. Furthermore, the use of beverage specific questions using
45
46 flash cards may have facilitated more accurate responses. However, difficulties in the assessment of
47
48 alcohol content may underestimate quantity consumed off-sales, particularly in relation to spirits
49
50 and wine thus resulting in an underestimate of quantity consumed off-sales (Lemmens, 1994). In a
51
52 nationally representative study of Dutch adults, where drink size was physically measured, spirits
53
54 and wine as actually poured by participants were found to be larger than the standard drink
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3 (Lemmens, 1994). In addition, 11% of respondents in our study refused to report their personal
4
5 income.
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8 *Implications for minimum unit pricing as a policy in Ireland*
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11 All alcohol-attributable harms are in principle avoidable (Rehm et al., 2006; Probst et al., 2014). The
12
13 primary objective of the introduction of a MUP is to reduce alcohol-attributable harms. Evidence
14
15 from Canada shows that the introduction of a minimum unit pricing is associated with a significant
16
17 reduction in alcohol consumption and alcohol-related harm (Stockwell et al., 2012a; Stockwell et al.,
18
19 2012b; Zhao et al., 2013). Some opponents of minimum unit pricing are concerned that consumers
20
21 using alcohol in a low risk manner will be punished with higher prices. Our findings do not support
22
23 these concerns, as unlike tax or excise measures, the introduction of a MUP would affect
24
25 approximately 14% of the population. More importantly, we have shown that a MUP of €1.00 per
26
27 standard drink would specifically target those suffering the greatest harm, high-risk drinkers, men
28
29 and those on low income. Studies have consistently shown that heavy drinkers have an increased
30
31 burden of alcohol-attributable harms (Rehm et al., 2009; Sheron et al., 2014). Similarly, liver and
32
33 alcohol-related mortality are strongly associated with low income and deprivation (Erskine et al.,
34
35 2010; Siegler et al., 2011; Mackenbach et al., 2015). Furthermore, as lower socioeconomic groups
36
37 are likely to be more responsive to an increase in price as shown in the case of tobacco (Townsend
38
39 et al., 1994), the introduction of a MUP may lead to a reduction in alcohol consumption, and
40
41 associated harms in lower socioeconomic groups. This is supported by findings from Finland which
42
43 showed that a large reduction in the price of alcohol led to a substantial increase in alcohol-related
44
45 mortality among those on low income (Herttua et al., 2008). These findings are important as some
46
47 opponents of MUP characterise it as an attack on the poor. In fact, the health benefits of MUP will
48
49 be more in evidence among poor men. Findings from our study also suggest that men will be
50
51 targeted with the introduction of minimum unit pricing in Ireland, which again supports this policy as
52
53 a targeted strategy, as men are disproportionately affected by alcohol-attributable harms. In Europe
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3 an estimated 13.9% of all deaths in adult men, compared to 7.7% in women, are attributable to
4 alcohol (Shield et al., 2012). Similarly, men in every racial group in the US experience a three-fold
5 elevated risk of alcohol-attributable mortality when compared to women (Shield et al., 2013).
6
7
8
9 However, in observational cross-sectional studies such as this, associations identified should be
10 viewed principally as hypothesis generating and our observed associations should be tested in
11 prospective studies monitoring consumption trends and associated harms following the introduction
12 of minimum unit pricing for alcohol. While our study identified those who currently purchase cheap
13 alcohol, we do not know the response of these drinkers to the introduction of minimum unit pricing
14 for alcohol.
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23 *Conclusion*

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26 Heavy drinkers, men and those on low income seek out the cheapest alcohol. As a result the
27 introduction of minimum unit pricing in Ireland is likely to target those suffering the greatest harm,
28 and reduce alcohol-attributable mortality in Ireland. Further prospective studies are needed to
29 monitor consumption trends and associated harms following the introduction of minimum unit
30 pricing of alcohol.
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Table 1. Participant characteristics and alcohol consumption (n=3,187)

	Men	Women	Total
	N (%)	N (%)	N (%)
Total	1,650 (54)	1,537 (46)	3,187 (100)
Age in years			
Mean (SD)	42.3 (14.9)	40.9 (14.7)	41.7 (14.8)
Marital status			
Married/cohabiting	1,113 (66.9)	988 (62.8)	2,101 (65)
Single	425 (28.4)	407 (29.6)	832 (29)
Separated/divorced	67 (3.3)	73 (4.1)	140 (3.6)
Widowed	44 (1.4)	69 (3.6)	113 (2.4)
Annual personal net income			
Below €20,000	669 (44.8)	832 (61.1)	1,501 (52.3)
Above €20,000	805 (55.2)	528 (38.9)	1,333 (47.7)
Alcohol consumption in the week			
Median (IQR) standard drinks in week	11.7 (15.2)	6.0 (7.3)	8.0 (11.6)
High risk drinking			
Audit-C positive	1,208 (75.8)	695 (48)	1,903 (63)
Audit-C negative	425 (24.2)	819 (52)	1,244 (37)
Total spend on alcohol in € in the week			
Median (IQR) spend in €	21.25 (32.2)	13.5 (21.3)	18.00 (27.9)

Table 2 Percentage of alcohol consumed by drink category and gender

	Men	Women	Total
	N=1,650	N=1,537	N=3,187
Beer	66.8	19.5	45.1
Cider	7.3	6.4	6.9
Wine	17.1	49.3	31.9
Spirits	8.2	23.3	15.1

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Table 3: Purchasing alcohol below the proposed minimum unit price of €1.00 per standard drink or 10 cent per gramme of alcohol

	< €1.00 per standard drink	€1.00 or more per standard drink	<u>Unadjusted analysis</u>		<u>Adjusted analysis</u>	
			Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Age						
18-24	42 (12.2)	326 (14.6)	1.00		1.00	
25-34	85 (29.7)	442 (22.9)	1.55 (1.02 – 2.35)	0.04	1.39 (0.83 – 2.32)	
35-49	139 (36.2)	837 (32.1)	1.35 (0.92 – 1.99)	ns	1.00 (0.61 – 1.66)	ns
50-64	74 (17.4)	588 (21.8)	0.95 (0.63 – 1.45)	ns	0.79 (0.47 – 1.36)	
65-75	26 (4.5)	321 (8.7)	0.62 (0.36 – 1.08)	ns	0.57 (0.29 – 1.11)	
Gender						
Female	150 (36.6)	1183 (45.0)	1.00		1.00	
Male	217 (63.4)	1334 (55.0)	1.42 (1.12 – 1.79)	0.004	1.95 (1.43 – 2.66)	0.000
Annual personal income						
Below €20,000	196 (57.8)	1144 (50.4)	1.35 (1.04 – 1.75)	0.025	1.64 (1.20 – 2.23)	0.002

Above €20,000	124 (42.2)	1120 (49.6)	1.00		1.00	
High Risk Drinker						
AUDIT-C positive	243 (69.6)	1568 (65.5)	1.20 (0.93 – 1.55)	0.16	1.56 (1.09 – 2.23)	0.01
AUDIT-C negative	117 (30.4)	919 (34.5)	1.00		1.00	
Where purchased						
On-sales only	19 (6.2)	1077 (42.9)	1.00		1.00	
Off-sales only	290 (83.0)	718 (29.3)	19.8 (12.0 – 32.8)	0.000	21.9 (12.5 – 38.1)	0.000
On-and-off sales	39 (10.9)	610 (27.9)	2.72 (1.49 – 4.96)	0.001	2.13 (1.10 – 4.12)	0.024

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Table 4: Purchasing off-sales alcohol below the proposed minimum unit price of €1.00 per standard drink or 10 cent per gramme of alcohol

			<u>Unadjusted analysis</u>		<u>Adjusted analysis</u>	
	< €1.00 per standard drink off-sales	€1.00 or more per standard drink off-sales	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Age						
18-24	82 (18.9)	121 (12.2)	1.00		1.00	
25-34	100 (30.1)	195 (21.7)	0.89 (0.60-1.32)	ns	1.17 (0.74 – 1.83)	
35-49	149 (31.1)	465 (37.7)	0.53 (0.37-0.76)	0.000	0.84 (0.55 – 1.29)	ns
50-64	79 (15.1)	254 (20.4)	0.48 (0.32 – 0.71)	0.000	0.66 (0.41 – 1.05)	
65-75	30 (4.8)	131 (8.1)	0.38 (0.23 – 0.65)	0.000	0.57 (0.31 – 1.02)	
Gender						
Female	168 (35.3)	669(54.0)	1.00		1.00	
Male	273 (64.7)	498 (46.1)	2.14 (1.68 – 2.72)	0.000	2.19 (1.65 – 2.90)	0.000
Annual personal income						
Below €20,000	248 (61.8)	512 (47.9)	1.76 (1.36 – 2.29)	0.000	2.01 (1.51-2.68)	0.000
Above €20,000	141 (38.2)	553 (52.1)	1.00		1.00	

High Risk Drinker

AUDIT-C positive	317 (75.4)	670 (60.7)	2.00 (1.53 – 2.60)	0.000	1.50 (1.09 – 2.02)	0.01
AUDIT-C negative	116 (24.6)	486 (39.3)	1.00		1.00	

†High Risk Drinking *

Personal Income

			1.98 (1.52-2.58)	0.000	-	-
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† The interaction effect between high risk drinking (AUDIT-C) and personal income did not remain independently significant in the multivariate model, therefore the model presented here excludes the interaction term

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